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Date: June 27, 1997

MEMO: DRAFT WARSIM ORD Version 3.6 is provided for formal, worldwide review. Comments received during our recent informal revision efforts were appreciated and those adopted are now part of this version. Please provide your formal comments using Form DA2028 (Recommended Changes to Publications and Blank Forms) NLT COB 11 Jul 97 to Mr. Richard Lawhon, NSC, COMM (913) 684-8324, DSN 552-8324, FAX Ext 8299, lawhonr@leav-emh1.army.mil.

Operational Requirements Document (ORD) for Warfighters' Simulation (WARSIM) 2000

27 June 97 (DRAFT Version 3.6)

WARSIM Table of Contents:

Send any comments, questions or recommendations to:

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1. General Description of Operational Capability. WARSIM 2000 will increase the effectiveness of commander and staff training, exercises, and staff mission rehearsals by dramatically increasing the realism and the scope of the available training environment. In conjunction with other simulations, WARSIM 2000 will provide a complete operational environment with scenarios covering the range of military operations within the stages of force projection operations to support globally distributed Army, joint, and coalition force task-based training.

1.1 . The WARSIM 2000 simulation system will use a computer-based simulation and associated hardware to support the training of unit commanders and their staffs from battalion through theater level as well as to support training events in educational institutions. Users of the simulation will train under the control and supervision of a senior trainer, usually the commander of the highest echelon command represented in the training audience, the next higher level commander, or an instructor within the Army schools and academies. Designed and built using modern computer technology, modern software engineering techniques, and validated algorithms and databases, it will allow units world-wide to train using their organizational equipment. A key feature of the system will be its use of technology to minimize the total Army's overhead associated

with supporting training. The system will be designed to be compliant with the emerging High Level Architecture (HLA) for advanced distributed simulation to facilitate interoperability with other HLA-compliant simulations, simulators, and live training events.

1.2 . The WARSIM 2000 simulation system will consist of, or use, several components:

1.2.1. Computer-based battle simulation models that portray the operational environment needed to support Army training events.

1.2.2. Software modules to support exercise preparation and scenario generation.

1.2.3. Software modules to support After Action Review (AAR).

1.2.4. Software modules for linking WARSIM 2000 to other simulations to expand the training environment for joint force training exercises.

1.2.5. Databases.

1.2.6. Computer systems to run the simulation applications and support the databases.

1.2.7. Workstations for use by personnel in an exercise support function.

1.2.8. Flexible and responsive terrestrial/satellite communications gateways and media for transmitting voice, data, facsimile, and video between different elements at remote locations involved in supporting a training exercise.

1.3. WARSIM 2000 will meet the Mission Need Statement's (MNS's) requirement for providing a training environment that will allow unit commanders and staffs to focus their Warfighters and systems in countering threats across the range of military operations. WARSIM 2000 is a constructive simulation within the Training, Exercises, and Military Operations (TEMO) domain. As such, it is intended to be used for individual and collective training, joint and combined exercises, mission rehearsal, and operational planning. WARSIM 2000 must provide an environment that presents problems to stress and stimulate commanders and their staffs to assess the situation, determine courses of action, and plan and issue new orders in a timely manner, all while using their organizational equipment and procedures.

1.4. Logistical support for WARSIM 2000 will be based on a government-owned, contractor-supported system. The government will own necessary hardware, have all proprietary rights to the developmental hardware and software components, and full license rights to the non-developmental software components of WARSIM 2000. Contracted logistical support will provide for the maintenance of government-owned computer hardware and software.

1.5. The acquisition and development strategy for WARSIM 2000 must abide by several constraints.

1.5.1. The WARSIM 2000 acquisition must build upon the successful infrastructure of current simulations so that the training community can train in an evolutionary,

progressive, yet consistent, manner. The Army has invested significant resources into developing its training simulation systems, linking them with other service simulations via the Aggregate Level Simulation Protocol confederation, and proliferating them throughout the Army and the international community. These systems provide a training environment and representations of combat that have been accepted by the training community. As a minimum, WARSIM 2000 must replicate the functional representations of the legacy systems (Corps Battle Simulation (CBS), Brigade/Battalion Battle Simulation (BBS), Battle Command Training Program (BCTP) Intelligence Collection Model (BICM), Tactical Simulation (TACSIM), and Combat Service Support Training Simulation System (CSSTSS). The WARSIM 2000 acquisition must allow the confederation of simulations structure to evolve in a manner that allows current users (Army and international) to maintain access to the confederation without having to make a substantial near-term investment in resources.

1.5.2. Fielding of new capabilities, whether they be functional representations or technological enhancements, must be either practically transparent to the user or be accompanied by training, so the user can understand and receive the benefit of the new capabilities.

1.5.3. The acquisition strategy must allow for regular user involvement in the development process. User evaluations and requirements must serve as a primary source for identifying changes to the system.

1.6 . WARSIM 2000 will be the primary contribution from the Army to the Joint Simulation System (JSIMS). WARSIM 2000 will provide simulation of the land warfare mission space objects (MSOs) for JSIMS. WARSIM 2000 will receive MSOs from JSIMS in areas such as Joint, Maritime, Air and Space, and Intelligence.

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2. Threat. Not applicable.

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3. Shortcomings of Existing Systems. Current simulations were designed for training commanders and staffs on command and control techniques for Army operations in mid-intensity combat. Current software is bound to proprietary operating systems and hardware. Current simulations do not include adequate functionality, for example, Combat Service Support (CSS), space support, or Intelligence and Electronic Warfare (IEW). The software design, especially the underlying representation of terrain, precludes representing the detailed functionality required for resolving the high resolution interactions needed to train commanders and staffs at levels from battalion to operational level commanders in joint scenarios for war and operations other than war (OOTW).

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4. Capabilities Required. This section specifies the operational performance parameters (capabilities and characteristics) required of the WARSIM 2000 system.

4.1. System Performance. The WARSIM 2000 system must provide the following operational, synthetic environment, and exercise support capabilities.

4.1.1. Army Operations.

4.1.1.1. The Range of Military Operations. WARSIM 2000 must support unit training in the following states of the environment: war, conflict, and peacetime; the system must provide the capability to train military operations in war as well as in other than war situations as enumerated in FM 100-5, *Operations*.

4.1.1.2. Force Projection Operations. WARSIM 2000 must support Active Component (AC) and Reserve Component (RC) unit commander and staff training in planning and executing mobilization and deployment, including assembly at mobilization stations, training time for a given level of proficiency, movement to a port of embarkation, movement between ports of embarkation and debarkation, movement to a marshaling area or point of forced entry, and transition into combat operations; movement schedules must be manipulable during an exercise. Users must be able to plan and execute intra-theater operational level movements. WARSIM 2000 must portray activities associated with post employment operations such as war termination and postconflict operations including restoring order and supplementing civilian government, and providing humanitarian assistance, redeployment and reconstitution, and demobilization.

4.1.1.3. Combat Functions. WARSIM 2000 will simulate the Tactical Level functions and subfunctions of Army Training and Doctrine Command (TRADOC) Pamphlet 11-9, *Blueprint of the Battlefield*. The following subparagraphs provide additional requirements beyond those stated in the Blueprint.

4.1.1.3.1. Maneuver. The simulation must portray the various capabilities of joint, combined and Army maneuver forces (heavy, light, special forces, and aviation) on the battlefield. The simulation must portray the forms of maneuver of envelopment, turning movement, infiltration, penetration, and frontal attack. The simulation must take into account the time and space factors associated with large unit movements (division and corps) and the differences between heavy and light units. All aspects of army aviation must be replicated (aircraft and command and control). All Army aviation mission profiles must be represented. The simulation must allow all units, to include combat support and combat service support units, to be committed to combat operations in response to threats in a rear area.

4.1.1.3.2. Fire Support. The simulation must portray fire support systems capabilities and limitations. All designated delivery systems and munitions categories must be simulated. Modeling must be at a level of detail commensurate with the need to accurately represent their respective capabilities and limitations, vulnerabilities, and employment techniques. Target attack techniques must, as applicable, follow the guidelines established in the Joint Munitions Effects Manual (JMEM). The effects of both area and precision, or smart, munitions must accurately reflect the particular munitions' capabilities and effects in the subsequent portrayal of the targeted units' characteristics and capabilities. This modeling must also include the representation of non-lethal systems and/or munitions such as obscurants, psychological warfare materials, and electronic warfare. Target acquisition systems must also be modeled, commensurate with the need to represent

their capabilities and limitations, vulnerabilities, and their employment techniques. The fire support command and control communications, to include fire coordination communications, must be realistically simulated for all major nodes that are not manned by members of the training audience.

4.1.1.3.3. Air Defense. WARSIM 2000 must simulate the detection, identification, engagement, and attrition of manned and unmanned aircraft and missiles by air defense systems. The system will simulate the acquisition systems' tactics and techniques, and capabilities and vulnerabilities under any environmental condition to include enemy electronic warfare. All systems' mobility capabilities and limitations must be within operational parameters. Weapons Control Status, Air Defense Warnings, and Rules of Engagement must be able to be changed interactively and to vary by unit. The simulation must provide data to stimulate air defense unit command post tactical radar scopes and displays so that early warning information can be passed to supported units.

4.1.1.3.4. Command and Control (C^2). WARSIM 2000 must simulate the doctrinal C^2 and decision-making processes for automated force units and support these processes as performed by the headquarters in the training audience.

4.1.1.3.4.1. Electronic Warfare (EW). The simulation must portray the effects of EW on communications, radar, and operations. This includes the ability to adversely affect both the training unit's and the simulated unit's communications systems, including the Opposing Forces (OPFOR). The effects of EW on personnel and equipment, such as optics and lasers, must also be portrayed.

4.1.1.3.4.2. Deception. The simulation must allow units to implement deception plans and activities within the capabilities of their equipment and systems.

4.1.1.3.4.3. Information Operations. The simulation must be able to portray the effects of information operations. WARSIM 2000 must be capable of portraying military operations within the Military Information Environment (MIE) that enable, enhance, and protect the friendly force's (BLUFOR's) ability to collect, process, and act on information to achieve an advantage across the full range of military operations. This includes interacting with the Global Information Environment (GIE) and exploiting or denying an adversary's information and decision capabilities.

4.1.1.3.4.4. Public Affairs. The simulation must consider the impact of public affairs operations. This must include, at a minimum: the effect of decisions made on public opinion; keeping the Army and American public informed; combating misinformation; enemy propaganda; facilitating media, and information operations.

4.1.1.3.4.5. Signal. WARSIM 2000 must realistically portray communications support for both the training unit and simulated units to include bandwidth and considering items from host nation communications assets available to handle the load caused by battlefield automation devices. WARSIM 2000 must degrade communications as a function of, at a minimum, extended ranges, equipment malfunctions, weather, terrain, time of day, network overload based on combat activities, and equipment destruction by hostile acts. The simulation must be capable of varying or nullifying the level of communications degradation.

4.1.1.3.4.6. Army Airspace Command and Control (A2C2). The simulation must stimulate the functions of A2C2 as it relates to airspace management. WARSIM 2000 will portray airspace management techniques to include Weapon Engagement Zones, Restricted Airspace, Air Corridors, and Joint Engagement Zones. Airspace Control Measures must be integrated and connected to all battlespace users. The simulation must support linkage to the Tactical Airspace Integration System (TAIS).

4.1.1.3.5. Intelligence. The system will explicitly simulate collection management, intelligence sources, collection systems, and subsequent intelligence product dissemination and its timeliness. WARSIM 2000 includes, as an integral component, the WARSIM 2000 Intelligence Module (WIM), to provide organization and structure for the software routines necessary to provide the threat representation and to meet the following training requirements of the intelligence training community, the commanders, and their staffs:

Fully automated Intelligence Sections, e.g., brigade Analytical Control Teams (ACTs), division/corps Analytical Control Elements (ACEs), etc.

A full compliment of Table of Organization and Equipment (TOE), e.g., pre-processors such as Common Ground Station (CGS), Ground Based Common Sensor (GBCS), GUARDRAIL Common Sensor - Integrated Processing Facility (GRCS-IPF), etc.

A scenario generation interface for Intelligence and Electronic Warfare Tactical Proficiency Trainer (IEWTPT).

4.1.1.3.5.1. The system shall accept collection missions and provide the data output that is appropriate to the collection system being simulated or stimulated. Example data include target location data, intelligence reports such as Size, Activity, Location, Unit, Time, and Equipment (SALUTE) and Situation Reports (SITREPs), Moving Target Indicators (MTIs), Fixed Target Indicators (FTIs), Synthetic Aperture Radar (SAR) mappings, secondary imagery, results of tactical interrogations, communications intercept and simulation of emitter output (e.g., Radio Frequency (RF), three Lines of Bearing (LOB), etc.) data. In the event that collection from a superior or subordinate echelon is not available, WARSIM 2000 shall provide data suitable for a fusion system such as the All Source Analysis System (ASAS).

4.1.1.3.5.2. WARSIM 2000 must accurately reflect the real-world operational constraints of intelligence operations in a multi-echelon force projection environment (direct, project, and protect the force, gain information dominance, and shape the battlespace). In addition, WARSIM 2000 will facilitate the effective vertical training of Military Intelligence (MI) assets (i.e., feed IEWTPT architecture) by providing pre-processor data as it would arrive from ground, air, maritime, echelons above corps (EAC), or allied assets for the following intelligence systems:

TEAMMATE (AN/TRQ-32(V)).

TRAFFICJAM (AN/TLQ-17A).

QUICKFIX (AN/ALQ-151).

TRAILBLAZER (AN/TSQ-138).

MANPACK (AN/PRD-11/12/13).

IEW Common Sensors (IEWCS):

GBCS-Heavy (AN/MLQ-39),

GBCS-Light (AN/MLQ-38),

Advanced QUICKFIX (AN/ALQ-151(V)3).

Joint Surveillance and Target Attack Radar System (J-STARS) Target Acquisition Subsystems:

Light Ground Station Module (AN/TSQ-178),

Medium Ground Station Module (AN/TSQ-168),

Common Ground Station (AN/TSQ-179(V)1).

GRCS - IPF:

System 4 (AN/USD-9B),

System 1 (AN/USD-9C),

System 3 (AN/USD-9D),

System 2 (AN/USD-9E).

Ground Surveillance Radars (AN/PPS-5/15).

Joint Tactical Unmanned Aerial Vehicle (JTUAV) HUNTER (BQM-155A) and OUTRIDER.

Improved Remotely Monitored Battlefield Sensor System (I-REMBASS (AN/PSQ-7)).

Tactical Exploitation System (TES).

Theater Rapid Response Intelligence Package (TRRIP) also known as the Counterintelligence (CI) Human Intelligence (HUMINT) Automation Tool Set (CHATS).

Electronic Processing and Dissemination System (EPDS).

Imagery Processing and Dissemination System (IPDS).

Enhanced Tactical User's Terminal (ETUT).

Mobile Integrated Tactical Terminal (MITT).

Enhanced Tactical Radar Correlator (ETRAC).

Tactical High Mobility Imagery Terminal (THMIT).

Forward Area Support Terminal (FAST).

WARSIM 2000 will also facilitate the effective horizontal integration of the Intelligence Battlefield Operating System (BOS) with the other BOSs.

The IEWTPT architecture will require digital replay media that provides a minimum of 24 hours of scenarios. However, the WIM scenario generation capability must be versatile enough to produce one hour to 96 hour scenarios tailored to specific geographic mission areas of interest. These scenarios for the IEWTPT architecture must include authentic audio and visual signatures to stimulate the IEW collections assets (e.g., Tactical Control Station for the JTUAV, the GBCS-Light Signal Intelligence (SIGINT) collector, etc.).

4.1.1.3.6. Mobility and Survivability. The simulation must portray the ability of all units to modify the battlefield (and supporting infrastructure) with respect to mobility, countermobility, survivability, and sustainment engineering. Units must be able to overcome barriers, obstacles and mines, and maintain and enhance movement through the activities of constructing/ repairing combat roads, trails, and bridges, forward airfields and landing zones; and facilitating movement on routes by conducting road, air traffic, refugee, and straggler control operations. Units must be able to emplace and mark barriers, obstacles, and mines; detonate mines/ explosives; and deceive the enemy on the location of obstacles. The simulation must account for the survivability measures taken by a force to protect its personnel, equipment and supplies from enemy and friendly systems and natural occurrences. These measures must include protecting against combat area hazards; employing operations security; conducting deception in support of tactical operations; maintaining counter-reconnaissance, security, and readiness; and evacuating non-combatants.

4.1.1.3.6.1. Nuclear, Biological, and Chemical (NBC). WARSIM 2000 must portray the initial and residual effects of nuclear, biological, and chemical weapons employment. Projected, mobile, and fixed smoke effects and flame weapons will be included. The degradation effects of defensive measures; i.e., mission oriented protective postures, and the consumption of resources for restoration of combat capability; e.g., decontaminants, will be an integral element of the simulation.

4.1.1.3.7. CSS. The simulation must be capable of providing and accepting CSS information to the level of detail and format, e.g., Standard Army Management Information System (STAMIS), needed to train Warfighters at all levels, logisticians, and commanders and staffs of CSS units from battalion through EAC, in CSS functions. These units operate in direct and general support from theater down to company level. This includes the interactions that these units will have with their higher, lower and adjacent units; with other services; and with supporting STAMIS and Automated Data Processing (ADP) systems reports and outputs in logistics exercises as well as in combat arms and combined arms exercises. The simulation must portray the effects of not planning for all CSS functions (such as field service, postal, finance, and band

operations) on individual and unit effectiveness, including morale, as appropriate to the echelon being trained. The simulation must be capable of providing Weapons Systems Replacement Operations (WSRO) as a management tool used to supply the combat commander with fully operational major weapons systems, including required equipment and trained crews. The simulation must coordinate weapons systems repair, replacement, and transportation resources with the personnel group's crew replacement resources. The simulation must portray the effects of replacement packages to sustain all BOSs. The following logistics functions must be integrated to show the effects of degradation/attrition in one battlefield functional area affecting another battlefield functional area.

4.1.1.3.7.1. Maintenance. The simulation must model random reliability, availability, and maintainability (RAM) failures; battle damage assessment; recovery activities; manpower and parts availability; availability of Test, Measurement, and Diagnostic Equipment (TMDE) and Special Tools and Diagnostic Equipment (STDE); time to repair; collection and classification activities; repair of damaged equipment; and produce doctrinally formatted Standard Army Maintenance Systems (SAMS); and The Army Maintenance Management System (TAMMS) reports (e.g., the 2406 and 1352 reports). Maintenance activities simulated will include Organizational, Direct Support, General Support, and Depot Levels of Maintenance for non-aviation maintenance. The simulation will model the three levels of aviation maintenance (Aviation Unit Maintenance (AVUM), Aviation Intermediate Maintenance (AVIM), and Depot Maintenance). With respect to maintenance, the simulation must track all assigned weapons systems, their unit assignment, mechanical condition, and expected date of return from maintenance.

4.1.1.3.7.2. Transportation. The simulation must represent the impact of road, rail, port, air, ship and barge capacity, river transportation, inland/coastal waterways, and movement (air, land and sea), varying capacity pipelines (water, gas, oil, etc.), variable gage railways (not one generic size fits all), tunnels, terminal transfer operations (transfer of cargo from one mode of transportation to another mode of transportation), and air delivery systems for both fixed wing and rotary as they affect network congestion and the ability to support civilian and military unit movements. WARSIM 2000 must provide the capability to monitor programmed moves, manage unprogrammed moves, and provide intransit visibility to meet the logistical demands of the training audience. WARSIM 2000 will simulate the effects of wear and tear and battle damage on the transportation network. Training of the transportation management activity requires WARSIM 2000 to produce selected Department of the Army Movements Management System - Redesigned (DAMMS-R) formatted reports. Additionally, the simulation must represent Reception, Staging, Onward Movement and Integration (RSOI) through its various stages from deployment through transfer of authority to the gaining command. The simulation must provide inbound units, personnel and non-unit supplies and equipment, and produce selected Worldwide Port System (WPS) formatted reports. The simulation must model Joint Logistics Over The Shore (JLOTS) operations.

4.1.1.3.7.3. Supply. The simulation must model the receipt, storage, issue and status of all played National Stock Numbers (NSNs) at every CSS activity that will provide selected Standard Army Retail Supply System (SARSS) formatted outputs.

4.1.1.3.7.4. Ammunition. The simulation will provide the visibility of receipt, storage and issue of ammunition at any point where ammunition is processed, down to the Department of Defense Identification Code (DODIC) level of resolution. It will provide selected Standard Army Ammunition System (SAAS) formatted outputs.

4.1.1.3.7.5. Liquid Logistics. The simulation must represent liquid logistics by product; the bulk capacity, receipt, storage, distribution, and transport of the products; and be able to monitor their consumption. It must also model the production of potable water. Simulation generated damage or loss of transporting equipment, liquid logistics storage or distribution assets must be reported. The simulation must track three fuel types, the quantity of petroleum, oil, and lubricants (POL) issued and received for each POL facility, and the products which are destroyed or contaminated.

4.1.1.3.7.6. Medical. The simulation must model medical evacuation, patient status and regulation by Social Security Number (SSN), name and rank, surgical initiation and management, class VIII management, blood management, and bed regulation. It must simulate medical treatment and medical transfer facilities, and Medical Logistics (MEDLOG) from division through EAC level. The simulation must provide selected formatted outputs from The Army Medical Management Information System (TAMMIS). The simulation must portray mass casualties and NBC-contaminated casualties. Capacities of medical facilities, the availability of transport for evacuation, and the traffic generated by the movement of casualties and of medical supplies and units, must be included in the simulation.

4.1.1.3.7.7. Mortuary Affairs. WARSIM 2000 will simulate the activities of concurrent return or interment and account for remains processed, evacuated and, as ordered, buried. It must provide visibility of remains held at any mortuary affairs element in the system; and, based upon casualty data from the personnel system, account for patients that have died enroute to a medical treatment facility. The simulation must model NBC-contaminated remains.

4.1.1.3.7.8. Personnel. The simulation must track every soldier inbound to the theater and those in theater by SSN, name, battle roster number, grade, Military Occupational Specialty (MOS)/Special Skill Identifier (SSI), Branch/ Area of Concentration (AOC) and duty description. The SSNs, names, battle roster numbers, grades, MOS/SSI, Branch/ AOC, and duty description must be able to be generated by the simulation based on the Standard Requirements Code (SRC)/TOE/Modified Table of Organization and Equipment (MTOE) of the participating units. It must flow replacements from replacement centers, track medical returns to duty, report personnel casualty data, and provide personnel strength reports. The simulation must portray the effect of replacement packages to sustain all BOS. Choice of individual, squad, crew, team, unit replacements and replacement techniques from theater, corps, or division to gaining unit must be available to operators at each level. It must provide selected Command and Control Strength Reporting System (C2SRS) extracts from Standard Installation/Division Personnel System (SIDPERS) formatted outputs. Personnel information such as name, SSN, grade and MOS must track across all elements of the simulation, wherever those data elements are used.

4.1.1.3.7.9. Host Nation and Non-Governmental Support. WARSIM 2000 must simulate

the use of Host Nation Support and Non-Governmental Support (Red Cross, United Service Organizations (USO), and other humanitarian services) assets in support of CSS and combat support operations. The capability to simulate the availability of host nation critical resources (e.g., railroads, trucks, boats, fuel supplies, roads, waterways, and medical treatment facilities, labor and air bases) must be provided in the system.

4.1.1.3.7.10. Religious Support Operations. The simulation must simulate the effects of religious support operations on the battlefield. In addition to the effect on human factors, the simulation must provide information on simulated unit morale, cohesion, and perceptions to the training unit chaplain.

4.1.1.3.7.11. Enemy Prisoners of War (EPW). WARSIM 2000 must portray realistic events associated with EPW. This includes the simulation of EPW before, during, and after combat operations. Users must be able to manage the handling, interrogation, and evacuation of EPW from the main battle area back to theater EPW collecting points.

4.1.1.4. Joint Capabilities and Missions. The simulation must portray the effects on Army operations of space, air, naval, amphibious, and other forces' land operations, including special operations forces. For example, the replenishment activities of a carrier battle group need not be specifically simulated, but the effect of its close air support, naval gunfire support, and selected intelligence, including terrestrial/space collection, assets must be modeled. WARSIM 2000 must also depict the CSS support normally provided by the Army to other services and allied forces, as well as that provided to the Army by other services and allied forces.

4.1.1.4.1. Space Operations. The simulation must accurately model the impacts of environmental effects on space systems, both natural and man-made. When confederated under JSIMS, National Air and Space Model (NASM) and National Systems Simulation (NATSIM) will publish space system information. However, when WARSIM 2000 is not run with NASM and NATSIM, it will have to generate, internally, space system simulations of appropriate fidelity. WARSIM 2000 will model the following products and impacts that space systems provide:

4.1.1.4.1.1. Space Communications. The simulation will model the application of satellite communications (ultrahigh frequency (UHF), superhigh frequency (SHF) and extremely high frequency (EHF)) for voice, data, video, and imagery, including the allocation process of the resources, and network infrastructure.

4.1.1.4.1.2. Position / Navigation / Tracking (in conjunction with satellite communications (SATCOM)). The simulation will model the application of the Global Positioning System (GPS) for maneuver, intelligence and electronic warfare, aviation, and combat service support.

4.1.1.4.1.3. Missile Warning. The simulation will model the elements of theater missile warning as they provide data to attack operations, active defense and passive defense.

4.1.1.4.1.4. Terrain Data. The simulation will model the space terrain imagery products used for mapping, drop zone identification, mission planning, three dimensional mission rehearsal, and trafficability.

4.1.1.4.1.5. Reconnaissance, Intelligence, Surveillance, and Target Acquisition (RISTA). The simulation will model unclassified / commercial satellites, national systems and Unmanned Aerial Vehicles products and operations, including their process for obtaining data and their space connectivity.

4.1.1.4.1.6. Space Related Information Operations. The simulation will model the operations of the Tactical Operations Centers (TOCs) and the space data flowing into them. TOCs are the center of the units' Information Operations (IO) and Battle Management Command, Control, and Communications (BMC3) and receive a variety of space data including SATCOM, missile warning, terrain, imagery, and weather data.

4.1.1.4.1.7. Weather Data. The simulation will allow the use of real weather data or for the insertion of scenario weather data previously collected/developed.

4.1.1.4.1.8. Threats. The simulation will model threat tactical ballistic missiles (TBMs), EW/intelligence warfare (IW), Overflight Intelligence, and future Anti-Satellite weaponry.

4.1.1.4.2. Airlift and Sealift.

4.1.1.4.2.1. The simulation must model both military and civilian means of airlift and sealift to account for mobilization of commercial carriers in accordance with policies and procedures.

4.1.1.4.2.2. The simulation must model use of airlift for forced entry operations to include capability to airdrop both personnel, equipment, and supplies.

4.1.1.4.2.3. The simulation must model use of sealift for forced entry operations to include capability to conduct amphibious assaults.

4.1.1.4.3. Special Operations. WARSIM 2000 will simulate the full range of special operations missions, including maneuver of Special Operations Forces (SOFs) on land and water outside of conventional units' area of responsibility. The simulation must portray the capabilities of small units to infiltrate and conduct missions (reconnaissance or destruction) against high value targets. The targets must include both military and civilian infrastructure.

4.1.1.4.3.1. Army Special Forces. The simulation must also account for the ability of special forces personnel to develop and lead units from within the civilian population (unconventional warfare) and to improve the combat effectiveness of other existing forces. The simulation must portray the ability of Special Forces to move with less likelihood of detection than conventional forces and to enhance the accuracy of precision-guided munitions through the use of laser markers and transponders.

4.1.1.4.3.2. Rangers. The simulation must portray the Ranger units' ability to operate in all weather and terrain at much higher efficiency than conventional infantry units. It must also portray the Ranger units' ability to operate deep inside enemy territory; e.g., deep penetration raids, interdiction, or forced entry operations, as well as their capability to direct joint fires.

4.1.1.4.3.3. Special Operations Aviation. The simulation must portray the ability of fixed and rotary wing special operations aircraft to infiltrate and extract personnel from denied areas. This includes refueling in flight, and longer flying time.

4.1.1.4.3.4. Civil Affairs. The simulation must portray the effect of decisions made regarding the civilian populace in a combat area. This must include, at a minimum, changes in refugee traffic, availability of foreign-nation support, and incidents of terrorism.

4.1.1.4.3.5. Psychological Operations. The simulation must consider the impact of psychological operations on combat effectiveness. This includes the immediate and persistent effects on friendly, allied, civilian, and neutral forces of loudspeaker and leaflet operations; media broadcasts; and deception operations as evidenced by troop morale, defections, surrenders, terrorism, sabotage, civilian interference, and counter-propaganda.

4.1.1.4.3.6. Search and Rescue (SAR). The simulation shall have the capability to plan, coordinate, and execute SAR and Combat Search and Rescue (CSAR) operations, and to support joint SAR/CSAR operations. The simulation shall also allow downed aircrews to perform survival, evasion, resistance, and escape (SERE) activities consistent with the level of resolution of the particular exercise.

4.1.1.5. Army Aviation.

4.1.1.5.1. WARSIM 2000 will simulate aviation operations. This includes coordinating air-space management, penetrating denied airspace, navigating nap of the earth, and conducting Forward Arming and Refueling Point (FARP) operations.

4.1.1.5.2. Air Traffic Services (ATSs). The simulation must portray the integration of ATS airway structure. ATS assets must be represented at the lowest level (Tactical Air Control Teams (TACTs)) as they will provide ATS support at staging bases, airfields, landing zones (LZs), pickup zones (PZs), drop zones (DZs), FARPs, and any austere landing areas. The simulation must portray the host nation ATS systems that exist, the airway structure, and allow for changes that must be made to allow for military use. Instrumented Meteorological Conditions (IMCs) recovery capabilities and the enroute navigational structure must be incorporated into the simulation to allow aircraft recovery during night and limited visibility conditions. The simulation must depict the relationship and integration of Army ATS and sister services' ATS systems when operating in a joint environment.

4.1.2. Synthetic Environment.

4.1.2.1. Terrain. The simulation must provide a level of resolution of terrain such that tactical considerations of terrain analysis and the dynamic effects of man-made or natural occurrences (e.g., bomb craters, minefields, battle damage on roads, the obstacle effect of rivers, hydrology, and weather) as considered during Intelligence Preparation of the Battlefield (IPB) and Engineer Battlefield Assessment (EBA) will affect the battle. The minimum acceptable tactical considerations include the following: the impact of line of sight (to include acoustic and electromagnetic spectrum considerations of concealment, thermal, optical, and radar visibility, and signal site emplacement) between

potential interactors whether they be terrestrial or space sensors or weapon systems, air, ship, space, or ground mounted; the ability of terrain to support the movement of personnel, vehicles and units over time; and the accurate portrayal of the location of natural and man-made obstacles. The outcomes of the simulated events must be sensitive to changes in the weather as it affects terrain. The senior controller must be able to alter or override simulation-induced changes to the terrain, such as obstacles.

4.1.2.2. Weather. The simulation must accurately portray the impact that weather elements have on operations (space, air, and ground), to include explicit consideration of aircraft minimum ceiling and visibility requirements, and environmental effects on communications. As a minimum, the simulation must account for the following weather elements: cloud amount and height, visibility, restrictions to visibility (e.g., precipitation, fog, smoke, dust and sand), precipitation accumulation (liquid or frozen), surface wind direction and speed (mean, gusts and gust spread), temperature, absolute humidity, density altitude, pressure altitude, barometric pressure, solar, lunar light data, scintillation and solar flare communications effects. The senior controller must be able to change these parameters during simulation execution. The simulation must be capable of using historical climatic conditions for the area of operations from existing databases or current real world weather existing at the time of the exercise. These weather elements must be allowed to range from tropical to arctic regions, to vary over the geographic area of interest, and to change as often as hourly. In addition, wind direction and speed and temperature in a vertical profile up to 70,000 feet must be allowed to impact NBC weapons and air platform performance with changes incorporated at least twice per day. The simulation must portray the effects of extremes of temperature, humidity, wind, and precipitation on human and equipment performance when operating in environments such as jungle, arctic and desert.

4.1.2.3. Fidelity. The simulation must be able to portray a level of detail that captures the effects of individual entities on the battle; e.g., single weapon platform, emitter, and sensor systems. Entities that operate as cohesive units may be portrayed in aggregated units from team to battalion that represent the normal mode of employment. Individual, low-density, entities that operate in a geographically dispersed mode must be portrayed as they are employed; e.g., signal nodes, radars, jammers, missile and rocket systems, engineer obstacle systems, and individual surveillance and laser designation systems. At Initial Operating Capability (IOC), WARSIM 2000 will track individual platform locations in the synthetic environment and maintain consistency of these locations in time and space within simulated units. The number of items tracked by CSS systems will be limited in any exercise by a Played Items List. All modeled systems will use performance data appropriate to the level of classification of the exercise. Movement of all systems must be within the normal operating abilities of each system and allow for the influences of tactics, techniques, procedures, formations and dispersion, road/surface conditions, off-road maneuverability for different terrain profiles and conditions, and the time required to occupy or vacate a position.

4.1.2.3.1. Reports. The simulation must provide feedback to the training unit by sending reports of simulated events. These reports must be formatted in a doctrinally correct fashion in proper STAMIS, or Army Battle Command System (ABCS) (e.g., CSS Control System and/or Maneuver Control System) formats, if applicable, and occur in a time or event-appropriate manner. The reports must not reveal all of ground truth, but

reflect that information that the simulated unit will reasonably know given its status, time removed from the reported incident, and deployed intelligence assets. The reports must be able to be modified to meet changing report forms as Management Information Systems (MISs) evolve and change.

4.1.2.3.2. Battlefield Clutter and Congestion. The simulation shall accurately portray the effects of battlefield clutter. Units and separately modeled platforms will conform to the constraints of physical movement through congested areas. Destroyed units, platforms and other physical structures will continue to occupy space on the battlefield until removed by a unit having that capability. Functionality shall be incorporated to allow for a coordinated passage of units through other friendly units and obstacle zones.

4.1.2.3.3. Multiple Platform Kills. The simulation shall allow the continued engagement of targets already destroyed in cases where target reengagement is an explicit choice, either by human or simulated decision. Feedback as to target status will be provided consistent with actual capabilities; e.g., visual reconnaissance will provide actual condition/status of the target according to the capabilities of the reconnaissance platform and its sensors.

4.1.2.3.4. Human Factors. The simulation must portray the effects of operations on the human condition as it relates to combat effectiveness and the individual/unit ability to perform TOE missions. At a minimum, the simulation must consider unit morale and cohesion, time subject to hostile actions, availability of religious support, unit attrition rate over time, weather, and operational tempo.

4.1.2.3.5. Simulated Mistakes and Accidents.

4.1.2.3.5.1. Simulated Mistakes. WARSIM 2000 must cause simulated mistakes at the option of the senior controller, who will have control and visibility of simulated mistakes throughout the exercise.

4.1.2.3.5.2. Types of Simulated Mistakes. There are two types of mistakes: mistakes in actions taken, which will change simulation ground truth, and mistakes in actions reported, which will not change simulation ground truth. Mistakes in actions taken include getting lost (e.g., arriving at or attacking the wrong location), delivering improper quantities of supplies, and/or delivering the wrong supplies. Mistakes in reporting include reports that are accurate but incomplete or reports that are complete but inaccurate (e.g., contain perceived truth), and the simulation must be capable of providing correct information if challenged for completeness and/or confirmation.

4.1.2.3.5.3. Simulated Accidents. WARSIM 2000 simulated units will undergo accidents based upon historical data from the US Army Safety Center. Accidents will occur to simulated WARSIM units based on the interaction and cumulative effects of the following hazards: weather, terrain, road conditions, and human factors. The senior controller will have control over all simulated accidents and can turn each event on or off as necessary.

4.1.2.3.6. Night/Reduced Visibility. The simulation must portray the effects of night and reduced visibility conditions on operations.

4.1.2.4. Automated Forces. Training units must be able to interact with the simulation without the presence of any other units. This will require the simulation to simulate forward, flank and rear units, supported and supporting units, as well as the next higher and lower echelon units, that will normally exist on the battlefield but are not present for the particular training event. The simulation must be able to portray dynamic scenario and event dependent intelligence and reports concerning the activities of these units as well as their requests for information and resources from the training units.

4.1.2.4.1. WARSIM 2000 must be capable of modeling represented units and activities to stimulate/enable training in peace building, peace enforcement, support to insurgency/counterinsurgency, counterdrug, antiterrorism, nation assistance, and disaster relief activities, and others. The simulation must portray realistic events associated with noncombatants and the related stress placed on operations and the logistics system.

4.1.2.4.2. WARSIM 2000 must permit simulated units to be controlled by a minimum number of personnel; e.g., one individual can control the operations up to division. The system must be capable of being changed between training events to reflect changes in doctrine, organizations, or procedures. WARSIM 2000 must support Simulated Forces (SIMFOR) consisting of up to 25 separate, distinct factions, or sides, in a single scenario at IOC and an unlimited number of factions at Final Operating Capability (FOC). These factions must be able to create and change alliances (friendly, neutral, hostile) during an exercise. The level of representation (command echelon) for all SIMFOR must be selectable during scenario generation and changeable during scenario initialization and execution.

4.1.2.4.3. Cognitive Modeling. The system will model the cognitive processes employed by and within automated unit headquarters as part of their decision- making process. Cognitive processes modeled will include the ability to reason on the factors of mission, enemy, terrain, troops, and resources available, and time. Reasoning on mission will include the ability to generate orders in the appropriate format to subordinate automated units, and reports to adjacent or higher automated or live units. Reasoning on enemy will include consideration of probable enemy courses of action. Reasoning on terrain will include considering the factors of observation, cover and concealment, obstacles, key terrain, and avenues of approach. The system will model development by automated units of courses of action or plans, and selection of a course of action for implementation. The system will include course of action analysis and comparison by wargaming friendly courses of action against probable enemy courses of action. The system will simulate inter-unit coordination of plans, orders, and actions. The system will model monitoring of execution of plans by subordinate, supporting, and adjacent units, replanning, and issuance of fragmentary orders or new orders.

4.1.3. Exercise Support. WARSIM 2000 must provide the following exercise support functions.

4.1.3.1. Scenario Generation. The FOC requirement is to allow scenario generation for any operation anywhere in the world. At IOC, the minimum requirements are for scenarios for war in Europe, Southwest Asia, Southeast Asia, and Korea and for operations other than war in these locations as well as Central and South America and Africa. This includes disaster relief scenarios in the above locations and in North

America. Additionally, scenarios for war and OOTW are required for the maneuver Combat Training Centers (CTCs), i.e., the National Training Center (NTC), the Joint Readiness Training Center (JRTC), and the Combat Maneuver Training Center (CMTC). The simulation system must allow commanders to train in conjunction with other national and international agencies. This includes the portrayal of non-aligned forces, non-combatant groups, and forces of unidentified or changing alliances. The scenario generation system must:

4.1.3.1.1. Allow users to rapidly build/change scenarios and establish the simulation environment. WARSIM 2000 must link to previously generated libraries of scenarios as well as other databases/systems containing relevant information such as training management systems (e.g., Standard Army Training System/Army-wide System for Automated Training and Doctrine (SATS/ASAT-D)), training support packages, and scenario data (e.g., digitized terrain). Given all required data, WARSIM 2000 must build scenarios from scratch within 80 labor hours for division/corps and 16 labor hours for brigade/battalion. WARSIM 2000 must build scenarios from existing scenarios in half that amount when initially fielded. These times will be reduced by one-quarter, minimum, with a goal of reducing these times by one-half, when WARSIM 2000 is fully fielded.

4.1.3.1.2. Create the databases needed to support designing and implementing the communications architecture supporting the training event.

4.1.3.1.3. Assist the trainer in identifying training objectives from unit and higher headquarters missions, plans, and tasks and the results of previous exercises to produce specific Army Training and Evaluation Program (ARTEP)-Mission Training Plan (MTP) tasks to train, and to produce candidate scenario events, that support achieving the identified training objectives.

4.1.3.1.4. Define SIMFOR structure in the form of missions, tasks, unit relationships, and resources (troops lists and equipment characteristics) appropriate to the training audience and the candidate scenario events, to produce requirements for simulated units and CSS items. The scenario generation system must automatically set initial conditions to the maximum extent possible, i.e., input current unit profiles from existing automated sources; for example, in the case of Army units, STAMIS files, or, in the event these files are not available, 100 percent (or a percentage specified by the exercise director) of the MTOE. WARSIM 2000 must be capable of sharing unit (MTOE-based) exercise or actual fill data with existing organizational command/control and administrative real-world unit files.

4.1.3.1.5. Establish the theater of operations including the cultural environment, weather, and terrain data. The scenario generation system must be capable of displaying multiple terrain boxes to accommodate multi-theater scenarios.

4.1.3.1.6. Establish the initial intelligence picture from intelligence assets, force laydowns, and SIMFOR task organizations to produce IPB products.

4.1.3.1.7. Identify start of exercise (STARTEX) positions from the above processes and scenario libraries to produce scenario operations orders (OPORDs) for SIMFOR

(including higher headquarters and adjacent units) and exercise databases (force files, deployment files, terrain files, BOS parameters, etc.).

4.1.3.1.8. Configure the Simulation. The WARSIM 2000 scenario generation system must provide automated tools to configure the software, hardware, and networks that comprise the simulation environment. The simulation configuration includes: network design, to include both wide area and local networks; system parameter selection; location, distribution, and configuration of computers and workstations, whether locally clustered or geographically distributed; and allocation of software to computers based on hardware location and load balancing across hardware.

4.1.3.1.9. Provide Simulation Configuration Testing. The WARSIM 2000 scenario generation system must include a simulation of the simulation capability to ensure that the simulation is technically feasible, i.e., communications networks have adequate capacity/connectivity to execute the exercise, that security, time synchronization and latency issues for distributed simulations are resolved, that linkage issues with virtual and live elements are addressed, and that the exercise can be executed within available time and resources (manpower/cost). This capability must simulate both the scenario and the simulation up to 50 times faster than real time. The scenario must be simulated to ensure that training objectives are incorporated in a coherent, logical manner, and that there are no data anomalies. The simulation must be simulated to plan tactical and simulation communications networks and nodes, and to determine the overhead to run the simulation; cost in time, equipment and support personnel (both role-players and technicians).

4.1.3.1.10. Load the Simulation and Synchronize. The exercise scenario must be instantiated into the simulation and unit command and control equipment.

4.1.3.2. AAR. WARSIM 2000 will support AARs within two (2) hours of demand via an After Action Review and Evaluation System (AARES). AARES must:

4.1.3.2.1. Concurrently create, retrieve, display, and distribute real-time AAR products as feedback without disrupting the simulation or training exercise.

4.1.3.2.2. Seamlessly link with AAR systems used in geographically dispersed live (such as AAR facilities at CTCs), virtual (such as the Close Combat Tactical Trainer (CCTT) AAR system), and other constructive simulations. Process/merge information collected from different simulation environments. AARES must also support joint exercises by providing data and AAR products to joint AAR systems such as JSIMS.

4.1.3.2.3. Produce a technical AAR on how the WARSIM 2000 simulation system performed during the exercise. The technical AAR will include, at a minimum, RAM and system performance data (mean, median, and peak values) relating to:

Communications, including the amount of system downtime attributed to communications and network capacity usage/adequacy (i.e., was the network capacity adequate, excessive, or deficient to handle required data flows?).

Software, including the amount of system downtime attributed to software,

recommended software/functionality fixes and improvements, and recommended changes/additions to associated software federations such as JSIMS.

Hardware, including the amount of system downtime attributed to hardware Central Processor Unit (CPU) capacity usage/adequacy.

Communications, software, and hardware performance data related to linking with other live, virtual, and/or constructive federations.

Databases, including the amount of system downtime attributed to databases and recommended fixes for improved fidelity.

Technical support, including facility and technician availability, downtime due to operator errors, late equipment and/or augmentee arrivals, and errors due to and lessons learned from exercise control procedures.

Time synchronization, including latency from the simulation to Command, Control, Communications, Computers, and Intelligence (C^4I) interfaces and back.

4.1.3.2.4. Allow the trainer/controller to monitor the AARES while not impeding the capability to perform other exercise control. AAR analysts will have on-line, real-time access to the battle and to Exercise Control (EXCON).

4.1.3.2.5. Support interactive AAR planning/control and AAR presentation among distant training sites that combine units in the same exercise by means of audio/visual conferencing and other appropriate telecommunications tools.

4.1.3.2.6. Provide an unconstrained view of the battlespace, and the ground and perceived truth.

4.1.3.2.7. Process, merge, and display information collected from unit command and control equipment.

4.1.3.2.8. Support analysis about the performance of the training audience as well as trends across events. The AARES must:

4.1.3.2.8.1. Specify the format and the definition for data collection to achieve training objectives in conjunction with the Scenario Generation System. The Scenario Generation System will identify candidate scenario events and specific ARTEP-MTP tasks that support achieving the training objectives. AARES must employ logic routines to identify conditions and standards for these tasks, and identify any applicable candidate automated products for review and selection by the AAR analyst. AARES must accommodate a range of AAR requests, from fully automated, standardized to semiautomated (allowing selected analysis) to custom AAR products/analysis.

4.1.3.2.8.2. Plan for the observation and data collection of critical events and accompanying ground and perceived truth. Provide information in a format that allows examination of BOS synchronization (e.g., coordination of maneuver planning with logistical planning); this includes providing products by BOS, and accepting and storing by BOS the verbal, visual, analog, and digital input submitted over the network from

observer/controllers (O/Cs) on site. Provide key-word search for data simulation event, and training task by BOS.

4.1.3.2.8.3. Allow users to pre-designate, or select for immediate collection, high interest events/information and other 'critical' events occurring over the electronic data stream to be identified and monitored. The system must provide automated data collection of *a priori* user-defined critical events and immediately notify users when a critical event begins. AARES will provide a status report of monitored events/information during the exercise without impeding the simulation, and after the exercise to support final and AAR and post-exercise reports. Critical events include:

New/changed mission.

Publish plan/order/Fragmentary Order (FRAGO).

Changed plan/order/FRAGO.

Available element of commander's critical information requirements (CCIR) (whether detected by the training audience (TA) or not).

OPFOR acquisition of essential elements of friendly information (EEFI).

Occurrence of fratricide.

Command post attacked/suppressed/destroyed.

Unit combat power falls below 'n' level.

Activity in named area of interest (NAI) (whether detected by training audience or not).

Engagement of targeted area of interest (TAI), or high value/payoff targets (HVTs, HPTs).

Deception operations.

Mass casualties.

Programmed mistakes by simulated units.

User-defined events.

4.1.3.2.8.4. Provide for the automated collection of required exercise data with a time stamp, to include data/information collected from unit command and control equipment and from different simulation environments with which WARSIM 2000 is interfaced.

4.1.3.2.8.5. Provide for the collection of information about controller interventions during exercises (e.g., controller destruction of a threat so that a unit can continue executing a mission) in a manner that allows these interventions to be correlated in time with other exercise events.

4.1.3.2.8.6. Automate the production and nomination of candidate AAR aids by

providing capability for tracking exercise training objectives and identified critical events to specific data collection and allowing the trainer/AAR analyst to select aids considered to be relevant to a specific training objective or task, including:

Capturing the state of battle at critical events and designated times.

Reviewing data (including archived data) against predetermined norms for indicators to alert O/Cs and/or AAR analysts of potential training audience performance issues (e.g., if artillery kills are low, determine if the artillery is improperly placed, reconnaissance is poor, etc.).

Capturing the execution of training tasks as they occur in the simulation.

4.1.3.2.8.7. Give the trainer/AAR analyst the capability to supplement automatically-produced standardized products appropriate to echelon(s) being trained with manually-produced products/aids. The AAR analyst must be able to modify existing information products or build new output displays; AARES must provide tools enabling additions to and modifications of AAR products and creation of custom displays to be made by users using the graphical user's interface (GUI), without costly reprogramming or other formal product improvement projects. The AARES must also allow users to create and modify data summary graph and table options, and store tailored templates and formats.

4.1.3.2.8.7.1. Specific flexibility requirements include the capabilities for nonprogrammers to: select from menus providing a wide variety of graph and table options; accommodate a wide variety of unit and equipment types, supply classes, multiple sides/nationalities, and combatants and noncombatants; add or modify briefing slide templates; add, modify, or delete libraries of graph, text, and figure displays; and create custom displays. AARES must provide the AAR analyst with a set of analytical tools/statistical functions such as are found in a spreadsheet, e.g., sum, average, median, standard deviation, variance, range, sort, and logical constructs.

4.1.3.2.8.7.2. The system will maintain automated records of such changes, learn when the products were used, and automatically offer the use of these products in future similar simulations. This includes the capability to support the implementation of new types of data displays integrating planning data, terrain data, weather data, communications data, observational data, and electronic data streams.

4.1.3.2.8.8. Provide statistics by rollups, unit (including rollups at all echelons), time, battle phase, and geographical area for each side and BOS, to include as a minimum:

Damage to SIMFOR systems.

Personnel casualties.

Equipment losses.

Correlation of forces.

Intelligence support to targeting.

IEW asset management.

Battle damage assessment.

Maneuver forces available, committed, engaged.

Weighting the main effort.

Degradation of forces.

Movement time lines.

(Selected activity) effectiveness.

Volume of fires.

Average rounds/mission.

Counterfire summary.

Fire mission process time.

Effects of targeting.

Class of supply consumption.

Air Defense Artillery (ADA) priority versus asset allocation.

Survivability status.

Obstacle status.

Family of Scatterable Mines (FASCAM) (asset) usage.

Medical evacuation.

Patient tracking.

Ambulance distribution.

Casualty evacuation times.

CSS available over time.

CSS stocks by location.

Logistics delivery time lines.

Operational status, perceived versus actual.

Controlled Supply Rate (CSR).

Maintenance status.

Orders distribution, time lines.

Host Nation support.

Control of dislocated civilians.

Programmed mistakes by simulated units.

Decision by all units (real and simulated).

User-defined statistics.

4.1.3.2.8.9. Collect and process unit status and perceptions. Unit status for both real and simulated units and perceptions (i.e., simulation truth, unit's perception of itself, and higher headquarters'/OPFOR perceptions) must be collected, processed, and displayed at all echelons, at critical events, at battle phases, and at specified times. Training audience perceptions are derived from Army Tactical Command and Control System (ATCCS) screens, plans, orders, O/C observations, and voice input/output (I/O). Unit status products include, as a minimum:

Map laydowns to assess radar, artillery, and ADA coverages.

Map laydowns of OPFOR artillery missions fired versus detected by the training audience.

Maps with overlays for maneuver, obstacles, fire support, contaminated areas, hydrology, trafficability, and CSS.

Map or tabular comparison of command post perceived truth of the battle (to include information in the unit's tactical data systems) versus ground truth.

Sustainment flow of critical information, supplies, and replacement personnel.

Unit variables include:

Position (i.e., location, orientation, and velocity).

Current plan, mission, order, etc.

Combat status (engaged, enemy acquired, etc.).

Disposition (i.e., percent moving, percent in hull defilade, etc.).

Formation.

Personnel.

Equipment.

Supply status by supply class.

Mission-Oriented Protective Posture (MOPP).

Morale/effectiveness.

4.1.3.2.8.10. Allow users to identify specific platforms and/or units of an exercise in real time or in history, and integrate observational data with electronic data. The AARES must integrate observations/explanations made during the AAR process with appropriate electronic data supporting these observations/explanations to support conducting AARs and follow-up actions. This includes the capability to automatically collect, and integrate for analysis, data from O/Cs who are dispersed across an exercise.

4.1.3.2.8.11. Have the capability of collection without data loss for exercise duration.

4.1.3.2.9. Support real-time, multi-media AAR presentation:

4.1.3.2.9.1. Support the storage, retrieval, and display of a library of AAR aids using text, graphics, and figures to describe alternative tactics, techniques, and procedures.

4.1.3.2.9.2. Provide standardized products incorporating playback capability that provide a dynamic graphical portrayal of the battle to date; C4I and audio and video products, including the capability to build animated segments; access to doctrinal resources; statistical products; terrain analysis; and O/C observations.

4.1.3.2.9.3. Synchronize playback with statistics and unit status playback displays and have the following minimum capabilities:

4.1.3.2.9.3.1. Speed can be set at real time or at variable rates up to 100 times faster/one half slower than real time.

4.1.3.2.9.3.2. Able to start, stop, pause, backup, or jump to any point in time from the STARTEX to the point in time of the AAR.

4.1.3.2.9.3.3. Simultaneously display both perceived views and simulation truth to provide a dynamic graphical portrayal of the battle to date.

4.1.3.2.9.3.4. Display forecasted and actual weather/terrain details available.

4.1.3.2.9.3.5. Accept, store, edit, and playback up to two hours of real-time audio and video.

4.1.3.2.10. Provide on-demand visual displays of critical exercise events within five minutes.

4.1.3.2.11. Provide responsive feedback to the training audience supporting the evaluation of mission rehearsals and course of action analysis, including time phasing of orders and critical information receipt and dissemination.

4.1.3.2.12. Allow users a reasonable degree of control over how terrain, weather,

planning, communications, and communications network data are displayed. AARES must be capable of displaying the effect of terrain on the battlefield.

4.1.3.2.13. Provide multi-media capabilities for simultaneous, synchronized displays of the battlespace visible to the entire training audience, including those at remote sites for distributed exercises; communications traffic from selected nets; map views with terrain and cultural features, overlays and platform icons; graphic and tabular data displays; and text and graphic displays from operational orders, messages, doctrinal references, and stored demonstrations and lessons learned resource libraries. Examples of such capabilities include portable screen printouts and overhead viewgraphs of unit locations (overlaid on maps with operations graphics), combat power and activities, and statistical graphs of unit resource consumption.

4.1.3.2.14. Allow the user to navigate through replays by providing a real-time capability to fast forward, move forward or backward directly from one point in time to another, and move forward or back in user-specified time increments.

4.1.3.2.15. Support the conduct of distributed AARs from existing facilities. If distributed sites do not have AAR facilities, the displays will be output to portable screen(s) visible by a group of at least 25 people.

4.1.3.2.16. Access the simulation for the current situation while conducting the AAR.

4.1.3.2.17. Automatically archive information into, and access archived information from, appropriate repositories.

4.1.3.2.17.1. Provide archival information/data to relevant organizations such as Center for Army Lessons Learned (CALL).

4.1.3.2.17.2. Provide support for preparation of Take Home Packages (THPs) (AC)/Proficiency Sustainment Packages (RC). These consist of the Final Exercise Review and all AAR products.

4.1.3.3. EXCON. EXCON ensures that the exercise is successfully conducted. WARSIM 2000 must fully support EXCON functions, to include O/Cs. Each exercise controller workstation must be able to access all functionality so that all exercise controller personnel can monitor the battle, on-line, in real time. WARSIM 2000 must enable EXCON to ensure that the scenario (events and specific ARTEP-MTP tasks), OPFOR and surrounding forces, and AAR collection plans and products support unit training objectives; workstation controllers maintain continuous operational support to the training audience; individual workstation controllers at OPFOR/ surrounding forces workstations access only the applicable information; and simulation and exercise clocks are maintained. WARSIM 2000 will enable the training audience and OPFOR/ surrounding forces controllers to interact with the simulated units with a minimum of interpretation of the simulation outputs.

4.1.3.4. Forward Interface. WARSIM 2000 must have a forward interface capability. The training audience must be able to interface with the represented units in WARSIM using organic C^4I systems, over local area network (LAN) and/or wide area network (WAN), in a manner that leaves the simulation transparent to the training audience. The senior

trainer must have the capability to (at his discretion and from his training location) observe and affect the scenario or platform dynamic characteristics or activities during the exercise; this includes the capability to retrieve any/all data and information available as perceived truth and game truth. Additionally, the O/Cs must be able to communicate with the WARSIM AARES, to view and exchange data and information (observations) and products with the AARES analysts. The Forward Interface also includes the Commander's Agility Function (CAF).

4.1.3.5. CAF. The full capability is to provide a mechanism for the commander and his command group (up to six) to move about the battlefield to see the battlefield and to command the force from any location on the battlefield. The system must present the perspective as will be seen from the best viewing point (in terms of line of sight) within 25 meters to a specified platform (air or ground) in the simulation based on the platform's current location, orientation, and velocity. The users will be subject to attrition in the simulation based on the vulnerability of their platform and its activities in the simulation. The user must be able to adjust the orientation of the view and make adjustment to the view point while staying within 25 meters of the associated platform. Moving the view point beyond 25 meters from the associated platform will require moving the platform in the simulation to a new location. In addition to the full capability, the CAF will provide visual output to selected members of the TA in the field. The CAF is not an IOC requirement.

4.1.3.6. Exercise Planning. WARSIM 2000 must facilitate and assist exercise planning in conjunction with scenario preparation. Exercise planning includes the following:

4.1.3.6.1. Identify the exercise training audience.

4.1.3.6.2. Identify all resource requirements necessary to conduct the exercise (personnel, facilities, time, and equipment).

4.1.3.6.3. Identify important exercise activities and milestones.

4.1.3.6.4. Address all administrative requirements and coordination activities (billeting, shifts, STARTEX, AARs, etc.).

4.1.3.6.5. Develop the exercise control structure, to include the exercise director, OPFOR, and O/Cs.

4.1.3.7. Technical Control. WARSIM 2000 will provide a technical control capability for the simulation system. Technical control monitors hardware, software and communications to determine if they are running correctly. Technical control is responsible for fault prediction, correction, and check point management. Technical control is responsible for executing any required immediate fixes and/or restarts. The WARSIM 2000 system will provide automatic tools to assist technical controllers.

4.1.3.8. Video Teleconference (VTC). WARSIM 2000 must provide a VTC capability to expedite exercise planning, execution, and post-exercise activities. VTC must be available for senior control functions and AARs, including those at remote sites for distributed exercises. Multiple sites need to be linked simultaneously.

4.1.3.9. Course of Action (COA) Analysis Tool. WARSIM 2000 will contain a COA analysis tool which models the COA analysis process as described in Field Manual (FM) 101-5, *Staff Organization and Operations.* This tool will be accessible by the training audience through their C^4I devices and by WARSIM 2000 controllers through their workstations. The tool will be capable of setting up courses of action from battalion to corps level from existing scenarios within one hour and will run up to 50 times real time without interfering with the simulation in progress.

4.1.3.10. Training Support Packages (TSPs). A TSP is a set of instructions describing how to plan, prepare, and conduct training. A TSP also provides pre-exercise event generation. WARSIM 2000 must generate automated TSPs in conjunction with other exercise support functions (WARSIM will link to previously generated TSPs via SATS). These automated TSPs will include at a minimum: scenario overview (scenario history, training environment, training objectives, target audience, equipment requirements, and training and evaluation outline), training unit materials (OPORD, execution matrix, maps and overlays, and overview of simulation requirements), SIMFOR materials (commander instructions, orders, and entities), and exercise director support package (O/C package, rules of engagement, and AAR framework/instructions).

4.2. Logistics and Readiness.

4.2.1. Reliability and Maintainability (R&M). R&M requirements are defined in the R&M Requirements Analysis.

4.2.2. Life Cycle Contractor Support (LCCS). A system of LCCS will be required to support post deployment of WARSIM at the fielded locations. Contract support will be in terms of technical maintenance of the hardware and software that composes the fielded WARSIM system and simulation and exercise support as needed. There is not a requirement to constantly man Forward Interface Modules (FIMs); contractors shall be available on site to begin moving mobile FIMs within one hour of notification (see paragraph 5.7.1.2.).

4.3 . Other System Characteristics.

4.3.1. Key Performance Parameters (KPPs). KPPs are such significant system capabilities and characteristics that failure to satisfy them in the FOC configuration may adversely affect system acceptance and program continuation. The threshold values represent the minimal acceptable value to satisfy the need; objective values are those desired by the user and which the Program Manager is attempting to obtain. The following represent the WARSIM 2000 KPPs:

PARAMETER	THRESHOLD	OBJECTIVE
Exercises Supported	Theater/Multi-echelon Corps.	
Automated Units	Fully Automated Battalions.	Fully Automated Divisions.
Extensibility	Full HLA specification compliance.	
Factions	Up to 25 factions with variable alliances per scenario.	Unlimited number of factions within a single scenario.
SIMFOR	Level of representation equal to BLUFOR.	
User C^4I Interface	Battalion through Corps ABCS devices.	Up to Land Component Command (LCC) Army Global Command and Control System (AGCCS) devices plus voice recognition and speech synthesis.

4.3.1.1. Exercises supported includes consideration for the size of the exercise, the training audience supported, the tools provided, and system reliability over the duration of a standard exercise. WARSIM 2000 must support exercises up to theater-level with one or more echelons in the training audience. The scenario generation tool must allow users to build new scenarios within 80 labor hours for division/corps and 16 labor hours for brigade/battalion, and modify existing scenarios in half that time. The AAR tool must provide analysts a set of automated aids to plan, prepare, and conduct AARs during simulation execution without affecting system performance or reliability. The simulation itself, as a training tool, must provide a level of fidelity of outputs and reports tailorable to the training audience and the tasks to be trained to allow commanders and staffs to accomplish these tasks under the conditions and standards referenced in the corresponding MTPs.

4.3.1.2. The level of representation (platform, company, etc.) is a design consideration. WARSIM 2000 must be able to run with interaction from the training audience at battalion level directly to the simulated units. The goal is for a corps training audience to interact directly with division size units without the need for role-players, with corresponding capability for lower echelon training audiences.

4.3.1.3. WARSIM 2000 must be extensible in the future in a standard manner. Future cases of WARSIM will include the need to extend the WARSIM simulation to tailor training exercises. This extensibility may include eventual interoperability with such simulations as Combined Arms Tactical Trainer (CATT), (German) Battle Exercise Simulation System (GUPPIS), and other simulations of interest. WARSIM 2000 must be fully HLA compliant as defined by the Joint Technical Architecture (JTA).

4.3.1.4. WARSIM 2000 must support training audience communications over real C^4I equipment using real message formats. All communications must pass through the simulation environment to determine if communication is possible within the synthetic environment; live-to-simulated unit, simulated-to-live unit, simulated-to-simulated unit, and live-to-live unit communications may be subjected to jamming, interference, interception, and range considerations as determined by synthetic environment activities.

4.3.2. Security Levels. WARSIM 2000 must be able to operate in an unclassified mode as well as to accommodate multi-level security requirements for training with classified data in classified scenarios. This includes the ability to transmit classified data over the distributed network, use classified data as part of the model parameters in a classified database, media storage, purging of classified data from systems, denial of unauthorized users, etc. Required classification levels include secret for the bulk of the system and Top Secret/Sensitive Compartmental Information (TS/SCI) for intelligence models. Data used by WARSIM 2000 will have security levels ranging from unclassified to TS/SCI. A Defense Intelligence Agency (DIA)-approved method of running different security levels at the same time shall be provided in WARSIM 2000.

4.3.3. System Integrity. WARSIM 2000 must incorporate sophisticated protection against unauthorized access to the simulation system and theft, corruption or destruction of software or data.

4.3.4. Data Loss Prevention. Each software component of WARSIM 2000 not backed up by a data logger will have an autosave feature, allowing the recovery of unsaved changes in case of system failure.

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5. Program Support.

5.1. Maintenance Planning. The support concept for WARSIM 2000 will be determined through an analysis of reasonable alternatives. Any maintenance plan developed must cover all users and not leave the users to arrange for their own maintenance.

5.2 . Support Equipment. WARSIM 2000 will be designed to be maintained by standard test equipment and will include fault isolation capabilities to diagnose failures at a level commensurate with the final support concept.

5.3. Size. WARSIM 2000 will be scalable to support exercises ranging from battalion to multi-echelon corps or theater. A single WARSIM system must support either one large exercise or multiple, small (brigade and below) exercises. A WARSIM system will be capable of linking to another WARSIM system to create a larger, multi-theater exercise.

5.4 . Human Systems Integration.

5.4.1. Man-Machine Interface. Man-machine interfaces for WARSIM 2000 exercise support personnel must be compatible with commercial standards and practices. The simulation system must not require any special training of the training user for its operation. Man-machine interfaces are not required for the training audience because the interface is with organic C4I systems.

5.4.2. Manpower Support. The goal is for WARSIM 2000 to be operated by a support staff of fewer than one-third of the personnel it takes to support current simulations. When fully fielded, the WARSIM 2000 goal is no role-players unless desired by the senior trainer.

5.4.3. Voice Interface. A unique user-interface requirement is needed for unit personnel to interact directly with the simulation via voice instructions using organizational communications systems; i.e., the simulation must be able to recognize a multitude of voice commands as well as generate appropriate voice responses or independent reports.

5.5. Computer Resources.

5.5.1. Databases. The WARSIM 2000 system must have the ability to use, manipulate, input data to, and extract data from a variety of databases to include organizational system databases and standard army management information systems using standard Commercial or Government Off-the-Shelf database management systems. Information must also be uploadable and downloadable by stand-alone personal computer to facilitate the database build process. The WARSIM 2000 databases must be capable of being readily modified between training events to handle data for systems of any nation or hypothesized land, sea, air, or space system.

5.5.2. WARSIM 2000 will employ the Defense Modeling and Simulation Office (DMSO) Modeling and Simulation Data Engineering - Technical Framework (M&S DE-TF) for all data modeling.

5.6. C4I. Training unit personnel will use their organizational ABCS devices for all incoming and outgoing communications, data transfer, and interaction with the simulation. WARSIM 2000 will have to be completely integrated with each component of the organizational systems from tactical through operational level; e.g., Force XXI Battle Command - Brigade and Below (FBCB2), ATCCS, AGCCS, Standard Theater Army Command and Control System (STACCS), and the Army World-Wide Military Command and Control System (WWMCCS) Information System (AWIS). WARSIM 2000 must be able to send and receive information in the appropriate format via the media employed by the system or by the appropriate Modular Reconfigurable C^4I Interface (MRCI) common modules.

5.6.1. The system must comply with applicable provisions contained in the JTA to include Defense Information Infrastructure (DII) Common Operating Environment (COE) compliance.

5.6.2. Communications.

5.6.2.1. Unit-to-Simulation. WARSIM 2000 will have a means for allowing the unit to interact with the simulation when the simulation interface is beyond the unit's tactical communications range.

5.6.2.2. System-to-System. During large exercises, multiple senior controller, AAR analysts, and OPFOR/surrounding forces controllers workstations must be able to link to each other, from field locations, with a secure communications capability for carrying

video, voice, text, and graphics.

5.6.2.3. Unit-to-Unit. To support an integrated training exercise involving units at separate home stations that are not within doctrinal communications distances, the system must provide the ability to link their communications systems. WARSIM 2000 must simulate the tactical communications system to portray the effects of the battlefield environment (terrain, weather, and opposing force actions) upon the signals attenuation and mitigation of both training audience and represented unit communications.

5.6.3. WARSIM 2000 will be directly linked to unit ABCS equipment and able to upload data to and download data from this equipment. Data from this equipment will be used to generate scenarios useful to real-world mission planning systems, immersing the training audience in the exercise environment at the intended point in time and space at STARTEX. Unit command and control equipment must be restored to its original configuration at End of Exercise (ENDEX).

5.7. Transportation and Basing. WARSIM 2000 system components will be delivered and setup in existing Army battle simulation and training facilities in continental US (CONUS) and outside of continental US (OCONUS) that have been certified as capable of supporting WARSIM space and power requirements.

5.7.1. System Component Suites.

5.7.1.1. Simulation Computer Suite (SCS). The SCS is comprised of modular and scaleable components consisting of the CPU, technical and functional control workstations, preprocessor and post processor software, databases, battle models, communications network equipment to include the physical and wireless LAN/WAN, and ancillary software modules. Each SCS must be capable of being configured to meet the specific training requirements in terms of population, echelon of command and operational missions of the units being supported by a particular site. The actual size and configuration of the SCS for each site will depend on the units being supported from that site. For example, unit exercises that could require a different size or configuration of WARSIM 2000 to meet specific exercise needs are corps and division level exercises, battalion and brigade exercises, school exercises, RC unit exercises supported by USAR Battle Projection Centers (BPCs), the BCTP Warfighter exercises, and exercises conducted in conjunction with field training events at the CTCs (NTC, JRTC, CMTC).

5.7.1.2. Forward Interface Modules (FIMs). The FIM is composed of the system components that link the battle model and exercise support processes running from the SCS through a communications gateway LAN to the TA. For a command post exercise (CPX), the TA will be the commander and battle staff or students operating from Command Posts (CPs) set up in field or garrison locations. When used to support seminar type training events, the TA will be the commander and staff or students in a conference room or service school classroom environment. When a physical LAN is the connection between the simulation and the TA, the FIM must be capable of being linked through that physical LAN. When a physical LAN does not exist, such as the case for most of the exercises where the TA is in a field CP location, the FIM interface must be through a wireless LAN to the SCS. FIM components will operate on either local commercial power or on the tactical power of the unit(s) being trained. The FIM must be

capable of being moved to and set up in close proximity with the TA, whether in a field location, classroom, barracks day room, gymnasium, armory, or any other structure/location suitable for training. To support field CPXs where tactical CP moves are performed, the FIM must support the capability of the headquarters to maintain doctrinal communications and conduct the orderly transfer of C^2 functions to the new CP location.

5.7.1.2.1. Senior Trainer's Exercise Control Interface Module. Provides the senior trainer/instructor with computer terminal access to the exercise control software and a video-teleconference link with the personnel assigned to the exercise control staff.

5.7.1.2.2. Commander's Agility Function (CAF) Interface Module. Provides the capability for the CAF located in the Battle Simulation Center (BSC) with an additional capability to extend, when required, visual output (laptop computer) over a network to selected TA participants in field locations.

5.7.1.2.3. C^4I Systems Interface Module. Links the Army's C^4I systems that are assigned to the TA to the simulation.

5.7.1.2.4. O/C Interface Module. Links the O/C staff with the senior trainer, the exercise control/senior controller staff, and the AAR preparation staff. O/Cs must be able to communicate using hand-held wireless technology.

5.7.1.3. Transportability Requirements. To support use cases such as BCTP Brigade Training Program, the five (5) RC BPCs Training Program, and for units being deployed to areas where access to WARSIM 2000 is not readily available, the system components for both the SCS and the FIM must be designed both modular and scaleable to the degree that, within two (2) days, a complete system must be broken down and placed in packing cases that can be handled by two-person teams for delivery to temporary training facilities using commercial air, ground, or sea modes of transportation. Organizations currently on the proposed WARSIM 2000 fielding plan that will require a system with the above transportability capability and associated packing cases are the BCTP Battle Command and Battle Staff Training (BCBST) program (1 suite) and each of the five RC BPCs (5 suites). Two (2) suites with associated packing cases are to be developed and earmarked for support to units when they are deployed.

5.7.1.4. Surrogate C^4I Equipment. WARSIM 2000 will contain a single set of 50 personal computers (PCs) capable of running ATCCS software and interfacing with WARSIM for those training audience units not yet equipped with their ATCCS systems. The PCs will be part of the main simulation suite located at the National Simulation Center (NSC) and will be maintained by the LCCS provider.

5.8. Standardization, Interoperability, and Commonality.

5.8.1. Analytical Quality Algorithms. WARSIM 2000 shall make maximum use of analytical quality algorithms and Army standard algorithms, where available and practical to implement.

5.8.2. Open Architecture. The simulation system must comply with emerging standards

for HLA and Portable Operating System Interface (POSIX)-compliant operating systems.

5.8.3. Modular Software. The simulation must be designed in a modular fashion that permits distributed computing. Standards and protocols must be designed such that distinct models can have individual model configuration control. The requirement is for each model to be designed so that it can be changed and improved without affecting the design of the other models comprising the simulation system. This includes all WARSIM 2000 support functions such as exercise planning, the battle models/simulation, surrounding forces, OPFOR representation, linkages to tactical communications or the replication of communications, commander's agility, scenario generation, senior control, technical control, AAR capabilities and video teleconferencing requirements. The WARSIM 2000 system must be modularized and be specifically tailored to meet the unique environmental, infrastructure, and training configuration needs of each fielded site.

5.8.4. Model Parameters. The simulation must be designed so that all data; e.g., parameters for system performance, rules for expert systems, addresses for network nodes, etc., are not part of the simulation software itself. WARSIM 2000 must allow changes in scenarios, input parameters, rules, networks structures, etc., during an exercise with minimal disruption to the exercise.

5.8.5. Software Standards. The software comprising WARSIM 2000 must be documented to support a thorough process of maintenance, enhancement, upgrade support, verification, validation, and accreditation (VV&A). A VV&A suite of computer equipment and software shall be established at Fort Leavenworth, KS to assist the VV&A process.

5.8.6. Interoperability. WARSIM 2000 will be compliant with the current version of the Department of Defense (DOD) HLA and Runtime Infrastructure (RTI) and easily upgradable as these standards evolve. WARSIM 2000 will use the HLA RTI to interoperate with similarly compatible Army and other Service virtual simulators, constructive simulations, and live instrumented training facilities.

5.8.6.1. When interoperating with other simulation environments containing duplicate functionality, WARSIM 2000 will be able to selectively disable its organic functionality. It will also be able to provide functionality to the other environments.

5.8.6.2. WARSIM 2000 will be able to selectively activate and deactivate linkages to other simulations ands simulators while an exercise is in progress without disrupting the current exercise.

5.9. Time. The simulation must be capable of (1) running up to 50 times faster than real time to a predefined game clock time, or (2) for a specified time period, or (3) until occurrence of a user-specified event or threshold, while requiring minimal input and providing summarized output. Users must be able to age the simulation to accommodate a training scenario that describes actions in the midst of a campaign. When the simulation is being operated with real C4I systems, restarting, rollbacks, and similar changes in timing, the simulation must support automatic changes in the databases

associated with the real C4I systems. The senior controller must be able to have the simulation start, stop/interrupt, rollback to any specified point in scenario, restart from a given point or the initial conditions and conduct concurrent replay. The senior controller must have the capability to change any attributes of the simulated entities or the game characteristics at any time.

5.10. Mapping, Charting, and Geodesy Support. WARSIM 2000 will use standard National Imagery and Mapping Agency (NIMA)-produced terrain products, including Digital Terrain Elevation Data Level 2 (DTED2), Vector Map Level 2 (VMAP2), Tactical Terrain Data (TTD), and have the capability for implementing Digital Topographic Data (DTD) from NIMA's Global Geospatial Information and Services (GGIS) program, where available, to create the synthetic battlefield. Where NIMA-derived products are unavailable, WARSIM 2000 must generate the required terrain data for any location in the world within 36 hours. The simulation must be capable of employing non-contiguous battlefields. WARSIM 2000 must portray operations in separate theaters, in a two major regional conflict scenario. Terrain must support portrayal of amphibious and littoral operations as needed, and be capable of linking with naval ocean portrayal.

5.11. Environmental Support. All the equipment that comprises the WARSIM 2000 system is to be from commercial sources and be operated in facilities that conform to standard commercial power and environmental requirements.

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6. Force Structure Support. To minimize fielding costs, the WARSIM 2000 fielding plan utilizes and builds upon the infrastructure of BSCs already in place at Army field unit installations, service schools and centers, and the United States Army Reserve (USAR) BPCs located throughout the United States, Germany, and Korea. The paragraphs below describe the variable sizing requirements for the fielded versions of the WARSIM 2000 simulation computer suites.

6.1. Regional Training Centers (RTCs). The most cost effective method for supporting corps and division-level exercises is to centralize the simulation processing capabilities and surrounding forces representation and to electronically distribute the exercise to the TA home station training locations. There will be three (3) RTC sites, one (1) in CONUS and two (2) in OCONUS. The CONUS-based RTC will be centrally located at Fort Leavenworth, KS, where the Army's BCTP and the Army National Guard's Leader Development Center (LDC) are colocated. The NSC, also located at Fort Leavenworth, will host the Post Development Software Support (PDSS) facility and facilitate the VV&A program for the system. OCONUS RTC support will be in Germany and Korea. The RTC sites will require the largest and most extensive simulation computer suites in terms of CPU, battle model and workstations to portray the level of synthetic battlespace and combat activity to drive training exercises at the corps or division level of operations. The Fort Leavenworth RTC will be capable of supporting multiple corps/division exercises simultaneously. The RTC computer system will be capable of being reconfigured "on the fly" from running a single corps/division level simulation to a capability to run simultaneously up to ten (10) smaller, brigade/battalion level simulations..

6.2. Brigade/Battalion (B/B) BSCs. To fully support brigade and battalion training exercises by providing an "on demand" training environment, a smaller self-sufficient, stand-alone version of the SCS located at the RTC must be established at Army installations where concentrations of brigade and battalion-size units are stationed and at the RC BPC, which are responsible for exercise support to reserve units. While requiring the same functionality as the RTC suite, the size and quantity of BSC simulation suite components (CPU, battle model, ancillary software, databases, and workstations) will be significantly less than that required for the RTC. The RTC site will interface with and use the workstations at the BSC in providing the simulation framework to support the higher-level corps and division-level training.

6.3. School Training Sites. Comparable-sized B/B BSC SCSs are required for school training sites where WARSIM 2000 will be used to train units assigned to the school installations and for exercises and seminars conducted by the school for their students.

6.4. CTCs. The NTC, the JRTC, and the CMTC will also be assigned a comparably-sized B/B BSC WARSIM 2000 system to provide surrounding forces representation supporting their force-on-force engagement exercises.

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7. Schedule Considerations.

7.1. WARSIM 2000 IOC will be delivered in December 1999. At that time the delivered capability of the system will be what is achievable of the functionality that now resides in CBS Version 1.5.4, BICM, and CSSTSS Version 1.5.4 supply and transportation. IOC will also include the capability to simulate multi-sided conflicts, convoy operations, line-of-sight determinations, occurrences of fratricide, and a limited WIM functionality. Additionally, the functions to link the simulation with ABCS, automated scenario generation tool, automated AARs, enhanced GUI, and improved terrain representation are to be provided at IOC.

7.2. The delivered suite of IOC software and hardware will be capable of supporting a multiple-echelon corps/division level CPX. The system will be installed at the NSC, Fort Leavenworth, KS, with sufficient workstations and RTC communications interface software and equipment delivered and installed at Fort Hood, TX and Fort Carson, CO to support a "full up" corps or division level field CPX.

7.3. FOC is to be accomplished through the fielding of equipment and successive software builds to establish corps/division simulation capabilities at the NSC, Fort Leavenworth, KS, Warrior Preparation Center, Einsiedlerhof Air Station (AS), Germany, and the Korean Battle Simulation, Camp Casey, Korea. Stand-alone brigade/battalion simulation capabilities will be established throughout the Army installations where concentrations of brigades and battalions are based. These stand-along systems will also be used to support corps/division exercises. Service schools will receive a system configured to meet their specific needs, and the BCTP and USAR BPCs will be fielded systems that are configured to fit in transportable carrying cases to meet their unique training requirements. At least two additional systems will be configured to be transportable to meet deployment requirements.

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Glossary of Acronyms

A^2C^2	Army Airspace Command and Control
AAR	After Action Review
AARES	After Action Review and Evaluation System
ABCS	Army Battle Command System
AC	Active Component
ACE	Analytical Control Element
ACT	Analytical Control Team
ADA	Air Defense Artillery
ADP	Automated Data Processing
AGCCS	Army Global Command and Control System
AOC	Area of Concentration
ARNG	Army National Guard
ARTEP	Army Training and Evaluation Program
AS	Air Station
ASAS	All Source Analysis System
ASAT	Army-wide System for Automated Training
ASAT-D	Army-wide System for Automated Training and Doctrine
ATCCS	Army Tactical Command and Control System
ATS	Air Traffic Service
AVIM	Aviation Intermediate Maintenance
AVUM	Aviation Unit Maintenance
AWIS	Army WWMCCS Information System
B/B	Brigade/Battalion
BBS	Brigade/Battalion Battle Simulation
BCBST	Battle Command and Battle Staff Training
BCTP	Battle Command Training Program
BICM	BCTP Intelligence Collection Model
BLUFOR	Friendly Forces
BMC3	Battle Management Command, Control, and Communications

BOS	Battlefield Operating System
BPC	Battle Projection Center (5 in the RC)
BSC	Battle Simulation Center
C^2	Command and Control
C2SRS	Command and Control Strength Reporting System
C^4I	Command, Control, Communications, Computers, and Intelligence
CAF	Commander's Agility Function
CALL	Center for Army Lessons Learned
CATT	Combined Arms Tactical Trainer
CBS	Corps Battle Simulation
CCIR	Commander's Critical Information Requirements
CCTT	Close Combat Tactical Trainer
CGS	Common Ground Station
CHATS	CI HUMINT Automation Tool Set
CI	Counterintelligence
CMTC	Combat Maneuver Training Center
COA	Course of Action
COE	Common Operating Environment
CONUS	Continental US
CP	Command Post
CPU	Central Processor Unit
CPX	Command Post Exercise
CSAR	Combat Search and Rescue
CSR	Controlled Supply Rate
CSS	Combat Service Support
CSSTSS	Combat Service Support Training Simulation System
CTC	Combat Training Center
DAMMS-R	Department of the Army Movements Management System - Redesigned
DE-TF	Data Engineering - Technical Framework
DIA	Defense Intelligence Agency
DII	Defense Information Infrastructure
DMSO	Defense Modeling and Simulation Office
DOD	Department of Defense
DODIC	Department of Defense Identification Code
DTD	Digital Topographic Data

DTED2	Digital Terrain Elevation Data Level 2
DZ	Drop Zone
EAC	Echelons Above Corps
EBA	Engineer Battlefield Assessment
EEFI	Essential Elements of Friendly Information
EHF	Extremely High Frequency
ENDEX	End of Exercise
EPDS	Electronic Processing and Dissemination System
EPW	Enemy Prisoners of War
ETRAC	Enhanced Tactical Radar Correlator
ETUT	Enhanced Tactical User's Terminal
EW	Electronic Warfare
EXCON	Exercise Control
FARP	Forward Arming and Refueling Point
FASCAM	Family of Scatterable Mines
FAST	Forward Area Support Terminal
FBCB2	Force XXI Battle Command - Brigade and Below
FIM	Forward Interface Module
FM	Field Manual
FOC	Final Operating Capability
FRAGO	Fragmentary Order
FTI	Fixed Target Indicator
GBCS	Ground Based Common Sensor
GCCS	Global Command and Control System
GGIS	Global Geospacial Information and Services
GIE	Global Information Environment
GPS	Global Positioning System
GRCS - IPF	GUARDRAIL Common Sensor - Integrated Processing Facility
GUI	Graphical User's Interface
GUPPIS	(German) Battle Exercise Simulation System
HLA	High Level Architecture
HUMINT	Human Intelligence
HPT	High Payoff Target
HVT	High Value Target
IEW	Intelligence and Electronic Warfare
IEWCS	IEW Common Sensor

IEWTPT	IEW Tactical Proficiency Trainer
IMC	Instrumented Meteorological Condition
IO	Information Operations
I/O	Input/Output
IOC	Initial Operating Capability
IPB	Intelligence Preparation of the Battlefield
IPDS	Imagery Processing and Dissemination System
IPF	Integrated Processing Facility
I-REMBASS	Improved Remotely Monitored Battlefield Sensor System
IW	Intelligence Warfare
JLOTS	Joint Logistics Over the Shore
JMEM	Joint Munitions Effects Manual
JRTC	Joint Readiness Training Center
JSIMS	Joint Simulation System
J-STARS	Joint Surveillance and Target Attack Radar System
JTA	Joint Technical Architecture
JTUAV	Joint Tactical Unmanned Aerial Vehicle
KPP	Key Performance Parameter
LAN	Local Area Network
LCC	Land Component Command
LCCS	Life Cycle Contractor Support
LDC	Leader Development Center
LOB	Lines of Bearing
LZ	Landing Zone
M&S	Modeling and Simulation
MEDLOG	Medical Logistics
MI	Military Intelligence
MIE	Military Information Environment
MIS	Management Information System
MITT	Mobile Integrated Tactical Terminal
MNS	Mission Need Statement
MOPP	Mission-Oriented Protective Posture
MOS	Military Occupational Specialty
MRCI	Modular Reconfigurable C^4I Interface
MSO	Mission Space Object
MTI	Moving Target Indicator

MTOE	Modified Table of Organization and Equipment
MTP	Mission Training Plan
NAI	Named Area of Interest
NASM	National Air and Space Model
NATSIM	National Systems Simulation
NBC	Nuclear, Biological, and Chemical
NIMA	National Imagery and Mapping Agency
NSC	National Simulation Center
NSN	National Stock Number
NTC	National Training Center
O/C	Observer/Controller
OCONUS	Outside of Continental US
OOTW	Operations Other Than War
OPFOR	Opposing Forces
OPORD	Operations Order
ORD	Operational Requirements Document
PC	Personal Computer
PDSS	Post Deployment Software Support
POL	Petroleum, Oil, and Lubricants
POSIX	Portable Operating System Interface
PZ	Pickup Zone
R&M	Reliability and Maintainability
RAM	Reliability, Availability, and Maintainability
RC	Reserve Component (USAR/ARNG)
RF	Radio Frequency
RISTA	Reconnaissance, Intelligence, Surveillance, and Target Acquisition
RSOI	Reception, Staging, Onward Movement and Integration
RTC	Regional Training Center
RTI	Runtime Infrastructure
SAAS	Standard Army Ammunition System
SALUTE	Size, Activity, Location, Unit, Time, and Equipment (report)
SAMS	Standard Army Maintenance Systems
SAR	Search and Rescue
SAR	Synthetic Aperture Radar
SARSS	Standard Army Retail Supply System

SATCOM	Satellite Communications
SATS	Standard Army Training System
SCS	Simulation Computer Suite
SERE	Survival, Evasion, Resistance, and Escape
SHF	Superhigh Frequency
SIDPERS	Standard Installation/Division Personnel System
SIGINT	Signal Intelligence
SIMFOR	Simulated Forces
SITREP	Situation Report
SOF	Special Operations Force
SRC	Standard Requirements Code
SSI	Special Skill Identifier
SSN	Social Security Number
STACCS	Standard Theater Army Command and Control System
STAMIS	Standard Army Management Information System
STARTEX	Start of Exercise
STDE	Special Tools and Diagnostic Equipment
TA	Training Audience
TACSIM	Tactical Simulation
TACT	Tactical Air Control Team
TAI	Targeted Area of Interest
TAIS	Tactical Airspace Integration System
TAMMIS	The Army Medical Management Information System
TAMMS	The Army Maintenance Management System
TBM	Tactical Ballistic Missile
TEMO	Training, Exercises, and Military Operations
TES	Tactical Exploitation System
THMIT	Tactical High Mobility Imagery Terminal
THP	Take Home Package
TMDE	Test, Measurement, and Diagnostic Equipment
TOC	Tactical Operations Center
TOE	Table of Organization and Equipment
TRADOC	Army Training and Doctrine Command
TRRIP	Theater Rapid Response Intelligence Package
TS/SCI	Top Secret/Sensitive Compartmental Information
TSP	Training Support Package
TTD	Tactical Terrain Data

UHF	Ultrahigh Frequency
USAR	United States Army Reserve
USO	United Service Organizations
VMAP2	Vector Map Level 2
VTC	Video Teleconference
VV&A	Verification, Validation, and Accreditation
WAN	Wide Area Network
WARSIM	Warfighters' Simulation
WFX	Warfighter Exercise
WIM	WARSIM 2000 Intelligence Module
WPS	Worldwide Port System
WSRO	Weapons Systems Replacement Operations
WWMCCS	World-Wide Military Command and Control System

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